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85 56  
CLAIMS

1. A process for producing trehalose in plant cells capable of  
5 producing trehalase by growing plant cells having the genetic information  
required for the production of trehalose and trehalase, or cultivating a  
plant or a part thereof comprising such plant cells, characterised in  
that said plant cells are grown, or said plant or a part thereof, is  
cultivated in the presence of a trehalase inhibitor.
- 10 2. A process according to claim 1, wherein said plant cells have been  
genetically altered so as to contain a gene coding for a bipartite  
trehalose synthesizing enzyme in a plant expressible form.
- 15 3. A process according to claim 1, wherein said plant cells have been  
genetically altered so as to contain a chimeric trehalose phosphate  
synthase gene in a plant expressible form, preferably wherein the  
trehalose phosphate synthase gene comprises an open reading frame  
20 encoding trehalose phosphate synthase from *E. coli* in plant expressible  
form, more preferably wherein the open reading frame encoding trehalose  
phosphate synthase from *E. coli* is downstream of the CaMV 35S RNA  
promoter or the potato patatin promoter.
- a 4. A process according to ~~any of claim 1 to 3~~, wherein a *Solanum*  
25 *tuberosum* plant is cultivated, preferably wherein said plant has micro-  
tubers.
5. A process according to claim 4, wherein said plant is cultivated  
in vitro.
- 30 6. A process according to ~~any one of claims 1 to 5~~, wherein said  
trehalase inhibitor comprises validamycin A in a form suitable for uptake  
by said plant cells, said plant, or a part <sup>thereof</sup> thereof, preferably wherein  
the concentration of validamycin A is between 100 nM and 10 nM, more  
35 preferably between 0.1 and 1 nM, in aqueous solution.
- a  
b  
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D

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a

7. A process according to ~~any one of claims 1 to 5~~, wherein said trehalase inhibitor comprises the 86KD protein of the cockroach (*Periplaneta americana*) in a form suitable for uptake by said plant cells, said plant, or a part thereof.

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a

8. A process according to ~~any one of claims 1 to 5~~, wherein said plant cells have been genetically altered to contain the genetic information for a trehalase inhibitor, ~~preferably wherein the trehalase inhibitor is the antisense gene to the gene encoding the information for trehalase or wherein the trehalase inhibitor is the 86KD protein of the American cockroach (*Periplaneta americana*).~~

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9. A process according to ~~any one of claims 1 to 8~~, wherein a plant, or a part thereof, accumulates trehalose in an amount <sup>greater than</sup> ~~above~~ 0.01 % (fresh weight).

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10. A plant, or a part thereof, or plant cells, obtainable by a process according to ~~any one of the claims 1 to 9~~, which contain trehalose in an amount above 0.01% (fresh weight), preferably wherein said plant, or a part thereof is a *Solanaceae* species, more preferably *Solanum tuberosum* or *Nicotiana tabacum*.

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11. A plant part according to claim 10, which is a tuber or a micro-tuber.

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12. Tuber or micro-tubers of *Solanum tuberosum* containing trehalose.

13. Use of a plant, or plant part, according to claim 10 for extracting trehalose.

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14. Use of a plant, or plant part, according to claim 10 in a process of forced extraction of water from said plant or plant part.

15. A plant according to claim 10, which has an increased stress tolerance, ~~preferably increased drought tolerance.~~

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D

16. A chimaeric plant expressible gene comprising in sequence a transcription initiation region obtainable from a gene, preferentially expressed in a plant part, particularly the patatin gene from *Solanum tuberosum*, a 5'-untranslated leader, an open reading frame encoding a trehalose phosphate synthase activity, and downstream of said open reading frame a transcriptional terminator region, preferably wherein said transcriptional terminator region is obtainable from the proteinase inhibitor-II gene of *Solanum tuberosum*.
17. A plant derived and plant expressible gene encoding a bipartite trehalose synthesizing enzyme.
18. A vector comprising a chimaeric plant expressible gene according to claim 16 ~~or 17~~.
19. A recombinant plant genome comprising a chimaeric gene according to claim 18.
20. A plant cell having a recombinant genome according to claim 18.
21. A plant or a part thereof, consisting essentially of cells according to claim 20, preferably a plant from the species *Solanum tuberosum*.
22. A plant part according to claim 21, which is a tuber or a micro-tuber.
23. A process for obtaining trehalose, comprising the steps of growing plant cells according to claim 20, or cultivating a plant according to claim 21, or cultivating a plant part according to any one of claims 21 or 22, extracting trehalose from said plant cells, plants or parts.
24. A process for obtaining trehalose, comprising the steps of producing trehalose in plant cells, a plant or a part thereof, according to a process of ~~any one of claims 1 to 9~~, and separating or extracting trehalose from said plant cells, plant or part thereof.

ADD D<sup>2</sup>  
ADD F<sup>1</sup> & G<sup>3</sup>

add  
H<sup>3</sup>